Human embryonic stem cell-derived oligodendrocyte progenitor cells express the serotonin receptor and are susceptible to JC virus infection.

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Public Summary:
Stem cells offer an exciting new approach to treat numerous human diseases. Many chronic neurologic diseases including spinal cord injury (SCI) and multiple sclerosis (MS) are considered potential diseases in which stem cell-derived therapies could be beneficial. Indeed, oligodendrocyte progenitor cells (OPCs) derived from human embyronic stem (ES) cells have been injected into patients with acute SCI in order to initiate recovery and restore motor skills. However, numerous viruses exist that are capable of infecting and persisting with the central nervous system (CNS) of humans. The ability of the human neurotropic virus, JC virus, to infect and replicate within human ES-derived OPCs was examined in order to determine if these cells are susceptible to infection. These studies highlight that ES-derived OPCs are susceptible to JC virus infection and may offer a cellular reservoir for JC virus in transplanted patients.

Scientific Abstract:
We studied the susceptibility of human embryonic stem cell-derived oligodendrocyte progenitor cells to infection with JC virus, the causative agent of progressive multifocal leukoencephalopathy (PML). A human embryonic stem cell line, H7, was used to derive an enriched population of cells expressing the oligodendrocyte progenitor cell-specific marker NG2. These cells expressed the 5HT2a receptor (5HT2aR) for JC virus and were highly susceptible to infection. Infection was reduced by treatment with anti-5HT2aR antibodies and by the 5HT2aR antagonists ritanserin and ketanserin. This is the first demonstration that human embryonic stem cell-derived oligodendrocyte progenitor cells are susceptible to JC virus infection and indicates that cells poised to replenish mature oligodendrocytes in PML lesions may also be a target of viral infection.